Remarks/Arguments:

Claims 78-81, 87-90, 93 and 97 are pending.

Claims 78, 79, 87, and 88 have been rejected under 35 U.S.C. §102(b) as being as being anticipated by Asami et al. (US 5,415,978). Claims 80 and 89 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Asami et al. in view of Covey (US 4,919,506). Claims 81 and 90 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Asami et al. in view of Nitta (US 5,590,145). Claims 93 and 97 are objected to.

Claims 78 and 87 have been amended, and claims 79 and 88 have been cancelled. It is respectfully submitted that the claims are patentable over the art of record for the reasons set forth below.

The amended claims include the feature of "the semiconductor laser is wavelength locked."

The Office Action states that Asami discloses that "the semiconductor laser is wavelength-locked at 809 nm (Col. 16, lines 63-64) (the claim recites the semiconductor laser is wavelength-locked and that means the semiconductor laser has a constant wavelength)" (please see the 2nd last paragraph on page 3 of the Office Action).

However, Applicants note that Col. 16, lines 63-64 merely recite: "a semiconductor laser 102 adapted to emit a laser beam 100 at a wavelength 809 nm as excitation light."

Asami neither teaches nor suggests that the semiconductor laser is wavelength-locked, nor does Asami disclose that the wavelength is constant. The following reasons provide the distinction between the invention as disclosed by Asami and the present invention.

First, Asami teaches that: "... a problem results from the temperature dependency of the output and oscillation wavelength LD, that is, the droop phenomenon that the oscillation wavelength and output of the semiconductor laser vary during oscillation with a temperature change or the mode hopping phenomenon that the <u>output wavelength varies discontinuously</u>" (emphasis added; please see, e.g., Col. 3, lines 5-11 of Asami).

The solution as taught by Asami does not involve either a grating or a filter in order to lock the wavelength of the semiconductor laser (as is disclosed in the present invention,

please see page 53, line 32 to page 54, line 3). Rather, Asami solves the problem by using temperature control.

For example, Asami discloses that:

> "In a laser beam light source wherein a SHG element is used to generate a second harmonic to produce a laser beam of visible light as previously mentioned, the oscillation wavelength does not vary with a temperature change, but the output and wavelength of the semiconductor laser in the light source can vary with the temperature change, resulting in a laser beam output lowering with a temperature change" (emphasis added; please see, e.g., Col 7, lines 18-25 of Asami).
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> "... In contrast, the image forming method of the present invention operates a semiconductor laser pumped solid laser so as to continue oscillation during image formation and controls the temperature of the semiconductor laser pumped solid laser and wavelength conversation element... Since the semiconductor and/or the wavelength conversion element are maintained at a constant temperature, a laser beam of a constant power is available in a very stable manner without a droop or mode hopping phenomenon" (emphasis added; please see, e.g., Col. 7, lines 26-40 of Asami); and
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> "The temperature control means may be selected_from well-known means capable of temperature adjustment at such a precision. Exemplary controls are Peltier elements as used in the illustrated examples and heat-up arrangements utilizing a precise thermostat and a heater..." (please see, e.g., Col. 21, lines 8-17 of Asami).

Second, although Asami discloses that "... since a laser beam of visible light is provided by a wavelength conversion element which generates a second harmonic, such as a SHG element, the laser beam is free of a wavelength variation so that an image can be formed... without a variation... caused by a wavelength variation of the light source" (please see, e.g., Col. 7, lines 53-61 of Asami), the *tolerance for elimination of wavelength variation is greater than that for a wavelength-locked system*. In other words, the wavelength variation is greater by at least an order of magnitude, as discussed below.

Particularly, Asami discloses, in regard to Fig. 2, that:

> "Each light source 54 used in the image forming method of the present invention is a semiconductor laser excited solid laser

> having a semiconductor laser and a wavelength conversion element which are equipped with temperature control means. Among the combinations of the photosensitive layers with the laser beam, there are included at least two combinations <u>wherein a laser beam L has a wavelength falling within +20 nm from the maximum wavelength in the spectral sensitivity distribution of a photosensitive layer</u>..." (emphasis added; please see, e.g., Col. 15, line 63 to Col. 16, line 8 of Asami).

In Fig. 2 of Asami, laser beam L is output from the light sources 54 via the respective acousto-optic modulators (AOM's) 58. Hence, since the laser beam L has a wavelength variation of within <u>+20 nm</u>, the wavelength output from the light source, having a semiconductor laser, is <u>not</u> constant.

Quite differently, the present invention discloses that:

> "... the <u>oscillation wavelength of the semiconductor laser 20 is locked at the reflection wavelength of the grating 36</u>. In order to <u>adjust the oscillation wavelength to the phase-matched wavelength</u> of the optical wavelength conversion element 25, the angle of the grating 36 can be varied" (emphasis added; please see, e.g., page 53, lines 10-15 of the original English specification of the present application, hereinafter referred to as "P1"); and
>
> "Fig. 11 illustrates the relationship between the amount of phase-matched wavelength shift when a steady state is achieved and the temperature of low-temperature annealing... If low-temperature annealing is performed at 60°C, the annealing time is longer, but the <u>shift amount can be reduced to be 0.1 nm or less, whereby the problem of the reduced conversion efficiency is eliminated</u>. It is <u>preferable to suppress the amount of shift in the phase-matched wavelength to be about 0.2 nm or less</u>" (emphasis added; please see, e.g., page 32, line 15 to page 33, line 8 of P1).

In Figure 10 of P1, it is shown that for annealing at a temperature of 60°C, the amount of phase-matched wavelength shift (nm) is less than 1 nm after elapsed annealing time of several hours.

In other words, since the oscillation wavelength of the semiconductor laser of the present invention is locked or adjusted to the phase-matched wavelength, and the phase-matched wavelength is preferably set to have an amount of wavelength shift of about 0.2 nm

In other words, since the oscillation wavelength of the semiconductor laser of the present invei or adjusted to the phase-matched wavelength, and the phase-matched wavelength is preferably set tc amount of wavelength shift of about 0.2 nm or less, wavelength-locking allows for constant wavelengt variations or shifts of less than 1 nm.

Moreover, one skilled in the art would understand that wavelength-locking a laser, e.g., by usir gratings, would allow for wavelength variations or shifts to be controlled to within 1 nm or less.

Furthermore, a laser with a constant wavelength does not necessarily mean that it is waveleng However, the wavelength of a wavelength-locked laser would have to be constant.

Therefore, in view of the wavelength variation of $\pm$ 20 nm of the laser beam that is output fron source(s) of Asami, and since Asami neither teaches nor suggests a wavelength-locked semiconductor for wavelength-locking (e.g., via use of gratings or filters), Applicants' claims are novel and inventive least in regard to the feature of a wavelength-locked semiconductor laser.

None of the other cited references have been shown to make up for the deficiencies of Asami.

Therefore, it is respectfully requested that the rejections based on the cited references be with Dependent claims 93 and 97 are novel and inventive for the reasons set forth above and are therefore

In view of the amendments and arguments set forth above, Applicants respectfully submit that 81, 87, 89, 90, 93, and 97 are in condition for allowance which action is respectfully requested.

Respectfully submitted,

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Dated: June 23, 2006

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Beth Johnson

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